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Docket No.: E-41422

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MAIL STOP: APPEAL BRIEF-PATENTS

By: _____ Date: March 24, 2006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Before the Board of Patent Appeals and Interferences

Applic. No.	:	10/014,265 Confirmation No.:2778
Inventor	:	Rolf Brück, et al.
Filed	:	November 7, 2001
Title	:	Combustion Engine Assembly with a Small Volume Catalytic Converter
TC/A.U.	:	1764
Examiner	:	Hien Thi Tran
Customer No.	:	**24131**

Hon. Commissioner for Patents
Alexandria, VA 22313-1450

BRIEF ON APPEAL

S i r :

This is an appeal from the final rejection in the Office action dated October 19, 2005, finally rejecting claims 1-39.

Appellants submit this *Brief on Appeal* in triplicate, including payment in the amount of $500.00 to cover the fee for filing the *Brief on Appeal*.

Real Party in Interest:

This application is assigned to EMITEC Gesellschaft für Emissionstechnologie mbH of Lohmar, Germany. The assignment will be submitted for recordation upon the termination of this appeal.

Related Appeals and Interferences:

No related appeals or interference proceedings are currently pending which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

Status of Claims:

Claims 1-39 are rejected and are under appeal.

Status of Amendments:

No claims amended after the final Office action. *A Notice of Appeal* was filed on January 24, 2006.

Summary of the Claimed Subject Matter:

As stated in the first paragraph on page 1 of the specification of the instant application, the invention relates to a combustion engine with a given displacement H and a downstream catalytic converter for cleaning exhaust gases.

Appellants explained on page 8 of the specification, line 25, that, referring now in detail to the figures of the drawings and first, particularly to Fig. 1 thereof, there is seen a combustion engine 1, downstream of which a catalytic converter 2 is provided. Typically, such a catalytic converter 2 is constructed from one or more honeycomb bodies and is disposed in an engine compartment or under a floor tray or pan of a motor vehicle.

Appellants stated on page 9 of the specification, line 7, that, Fig. 2 shows a catalytic converter 2 which contains a honeycomb body 3. In the present embodiment of the invention, to which the invention is not limited, however, this honeycomb body 3 is constructed of alternating flat sheet metal layers 6 and corrugated sheet metal layers 7, which form channels 4. The sheet metal layers 6, 7 form channel walls 5 with an average thickness d. The sheet metal layers 6, 7 together form a geometric surface O of the honeycomb body 3. However, the sheet metal layers 6, 7 are coated with a ceramic, aluminum oxide based, so-called washcoat so that a very large porous surface is produced, which can be many times greater than the geometric surface O. A catalytically active substance, in particular a mixture of different noble metals, is applied to the non-illustrated washcoat.

Appellants also stated on page 9 of the specification, line 22, that, the diagram of Fig. 3 shows a number A of channels 4 per cross-sectional surface unit (cpsi) on the x-axis. A price per honeycomb body volume (price per liter) is shown on the left-hand side on the y-axis and a price per area (price per square meter) is shown on the right-hand side on the y-axis. Ranges in which the thicknesses d of metal foils typically available on the market can be used, are shown through the use of vertical lines. It is evident that metal foils having a thickness of 50 micrometers are particularly suitable for up to 500 cpsi, metal foils having a thickness of 40 micrometers are suitable for 500 - 600 cpsi, and metal foils having a thickness of 30 micrometers are suitable for 600 - 800 cpsi. Even thinner foils should be used for even larger numbers of channels per cross-sectional unit. A line P1 in the diagram shows how the price per liter increases with an increasing number A of channels 4 per cross-sectional unit. However, of more importance to the present invention is the fact that a curve P2 shows how the price per square meter decreases with an increasing number A of channels 4 per square meter. In the case of honeycomb bodies according to the invention, this means that while having the same geometric surface O, a smaller volume honeycomb body with a large number of channels is less expensive than a honeycomb body with a larger volume.

Appellants further explained on page 10 of the specification, line 20, that, the present invention thus teaches the cost effective use of small volume catalytic converters with a large number A of channels 4 per cross-sectional surface. In particular, the invention teaches the use of metal foils having a thickness on average of approximately 25 micrometers, or even 20 micrometers, for honeycomb bodies with more than 800 cpsi and up to 1200 cpsi. With such honeycomb bodies, an effectiveness of 98%, preferably even 99% is obtained, even when a volume V of a catalytic converter 2 connected downstream of a combustion engine 1 is only half or less of a displacement H of the combustion engine 1.

References Cited:

5,802,845	Abe et al.	September 8, 1998
5,455,012	Machida, et al.	October 3, 1995
6,080,345	Chalasani, et al.	June 27, 2000
WO 98/51410	Otani, et al	November 19, 1998
6,689,328	Otani, et al.	February 10, 2004

Grounds of Rejection to be Reviewed on Appeal

1. Whether or not claims 1-39 particularly point out and distinctly claim the subject matter which appellant regards as the invention under 35 U.S.C. § 112, second paragraph.

2. Whether or not claims 1-2, 13-21, and 32-39 are obvious over Abe et al. (U.S. Patent No. 5,802,845) (hereinafter "Abe") in view of Machida et al. (U.S. Patent No. 5,455,012) (hereinafter "Machida") and Chalasani et al. (U.S. Patent No. 6,080,345) (hereinafter "Chalasani") under 35 U.S.C. §103.

3. Whether or not claims 3-12 and 22-31 are obvious over Abe (U.S. Patent No. 5,802,845) in view of Machida (U.S. Patent No. 5,455,012) and Chalasani (U.S. Patent No. 6,080,345) and further in view of Ootani et al. (WO 98/51410) (hereinafter "Ootani") under 35 U.S.C. §103.

Argument:

Whether or not claims 1-39 meet the requirements of 35 U.S.C. § 112, second paragraph.

Claims 1-39 do meet the requirements of 35 U.S.C. § 112, second paragraph:

In item 3 of the final Office action, the Examiner alleges that it is unclear what "total volume" implies. The Examiner is in error. More specifically, the specification calls for "a honeycomb body with a total volume". Therefore, the total

volume is that of the honeycomb body. Furthermore, Webster's New World Dictionary defines "total" as: constituting a whole. Accordingly, "total volume" is the whole volume of the honeycomb body. The honorable Board is therefore respectfully requested to disregard the Examiner's remarks.

In item 3 of the final Office action, the Examiner alleges that it is unclear what is intended by "...smaller than... by at least a factor of 0.6." The Examiner poses the question does this include all values from 0.6 to indefinite. It does not include all values from 0.6 to indefinite. More specifically, claim 1 recites the limitation of "a catalytic converter disposed downstream of said combustion engine **for cleaning the exhaust gases**", before the limitation of "at least a factor of 0.6". It follows that the honeycomb body **must have a volume that is sufficient to clean the exhaust gases**, thereby setting a lower limit for the volume of the honeycomb body that is not "to indefinite". Instead, the range is from 0.6 to a size which will clean the exhaust gases. Therefore, the Examiner is in error, the claim is definite because the range does not include all values from 0.6 to indefinite. The honorable Board is therefore respectfully requested to disregard the Examiner's remarks.

Whether or not claims 1-2, 13-21, and 32-39 are obvious over Abe in view of Machida and Chalasani under 35 U.S.C. §103.

Claims 1-2, 13-21, and 32-39 are not obvious over Abe in view of Machida and Chalasani under 35 U.S.C. §103:

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 1 calls for, *inter alia*:

the catalytic converter having a geometric surface dimensioned to provide the catalytic converter with an effectiveness of more than 98% for converting at least one harmful component in the exhaust gases into harmless components.

With respect to the Machida reference, the Examiner bases the rejection on Figs. 10 and 11. Fig. 10 discloses HC purification efficiencies dependent on the partition wall thickness of a catalytic substrate in the first exhaust converter. Fig. 11 discloses HC purification efficiencies depending on the cell density of the catalytic substrate of the first exhaust converter. The highest efficiencies disclosed in Figs. 10 and 11 are below 90% HC purification efficiency. All other efficiencies that are disclosed in

Figs. 4, 5, 6, 7, and 9 are well below 90% as well. Even if the efficiency curves in Figs 10 and 11 were extrapolated, the efficiency would never reach a value of 98% or greater. Contrary thereto, the behavior of the curves shown is asymptotic with respect to a value of about 91 to 92%.

It is a requirement for a *prima facie* case of obviousness, that the prior art references must teach or suggest **all** the claim limitations.

The references do not show or suggest the catalytic converter having a geometric surface dimensioned to provide the catalytic converter with an effectiveness of more than 98% for converting at least one harmful component in the exhaust gases into harmless components, as recited in claim 1 of the instant application.

A combination of Abe and Machida does not disclose an efficiency of 98%. Even if a person of ordinary skill in the art would extrapolate the efficiency curves disclosed in Machida, an efficiency of only 91 to 92% is achieved. This is a very large difference compared to the 98% efficiency of the instant application. Therefore, the references do not show or suggest a 98% efficiency. This is contrary to the invention of the instant application as claimed, in which the catalytic

converter has a geometric surface dimensioned to provide the catalytic converter with an effectiveness of more than 98% for converting at least one harmful component in the exhaust gases into harmless components.

Chalasani does not make up for the deficiencies of Abe and Machida with respect to the above-noted features.

The Chalasani reference does not disclose any efficiencies. Chalasani does not disclose any volumes of honeycomb bodies with respect to the displacement of a combustion engine. Chalasani discloses a method for forming and shaping a honeycomb body which is stiffer in than usual honeycomb bodies. Therefore, Chalasani does not make up for the deficiencies of Abe and Machida. Furthermore, a person of ordinary skill in the art would not be motivated to use the teaching of Chalasani when trying to improve the conversion efficiency of the honeycomb body disclosed in Abe.

The references applied by the Examiner **do not** teach or suggest all the claim limitations. Therefore, it is believed that the Examiner has not produced a *prima facie* case of obviousness.

The following remarks pertain to the Examiner's response to arguments on page 7 of the final Office action.

The Examiner's allegation on page 7 of the final Office action that "since the range of the thickness of Machida et al. encompasses the instant thickness range, the effectiveness in Machida et al. would **inherent** be the same as that of the instant claims", is not correct. More specifically, Machida does not disclose a conversion effectiveness of 98% or greater, as is recited in claim 1 of the instant application. Furthermore, the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. It is noted that "in relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art" Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990). In the present case, the Examiner has not provided technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. Instead, the Examiner makes an incorrect statement that "with the 0.1 mm thickness, the effectiveness is about 92%". More specifically, Fig. 10 of Machida shows that the efficiency is well under **90%** for a partition wall thickness of 0.1 mm (the smallest substrate

thickness disclosed by Machida). Therefore, the Examiner's remarks that Machida shows that "with the 0.1 mm thickness, the effectiveness is about 92%" are not correct. Accordingly, as seen from the above-given remarks, the Examiner's remarks that "since the range of the thickness of Machida et al. encompasses the instant thickness range, the effectiveness in Machida et al. would inherent be the same as that of the instant claims", are in error. The honorable Board is therefore respectfully requested to disregard the Examiner's remarks.

Since claim 1 is allowable, dependent claims 2, 13-21, and 32-39 are allowable as well.

Whether or not claims 3-12 and 22-31 are not obvious over Abe in view of Machida and Chalasani and further in view of Ootani under 35 U.S.C. §103.

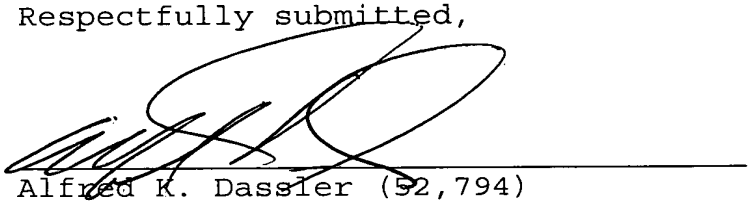
Claims 3-12 and 22-31 are not obvious over Abe in view of Machida and Chalasani and further in view of Ootani under 35 U.S.C. §103:

Ootani does not make up for the deficiencies of Abe, Machida, and Chalasani. Since claim 1 is believed to be allowable,

dependent claims 3-12 and 22-31 are believed to be allowable as well.

Based on the above-given remarks, the honorable Board is respectfully urged to reverse the final rejection of the Primary Examiner.

Respectfully submitted,



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Claims Appendix:

1. A combustion engine assembly, comprising:

a combustion engine having a displacement and emitting exhaust gases; and

a catalytic converter disposed downstream of said combustion engine for cleaning the exhaust gases;

said catalytic converter having at least one honeycomb body with a total volume smaller than said displacement by at least a factor of 0.6; and

said catalytic converter having a geometric surface dimensioned to provide said catalytic converter with an effectiveness of more than 98% for converting at least one harmful component in the exhaust gases into harmless components.

2. The combustion engine assembly according to claim 1, wherein said at least one honeycomb body has a cross-section and a number of channels through which exhaust gas can flow, said number of channels being at least 500 cpsi (cells per square inch) over said cross-section.

3. The combustion engine assembly according to claim 2, wherein said at least one honeycomb body is a metallic honeycomb body having at least one of layered and wound sheet metal layers being at least partly structured.

4. The combustion engine assembly according to claim 3, wherein said channels are separated from one another by channel walls having an average thickness of at most 40 micrometers.

5. The combustion engine assembly according to claim 3, wherein said channels are separated from one another by channel walls having an average thickness of at most 35 micrometers.

6. The combustion engine assembly according to claim 3, wherein said channels are separated from one another by channel walls having an average thickness of between 18 and 32 micrometers.

7. The combustion engine assembly according to claim 3, wherein said number of channels over said cross-section of said at least one honeycomb body is at least 600 cpsi, and said channels are separated from one another by channel walls having an average thickness of at most 32 micrometers.

8. The combustion engine assembly according to claim 3,

wherein said catalytic converter is a three-way catalytic converter converting at least 98% of hydrocarbons and nitrous oxides in the exhaust gases during normal operation.

9. The combustion engine assembly according to claim 3, wherein said catalytic converter is a three-way catalytic converter converting 99% of hydrocarbons and nitrous oxides in the exhaust gases during normal operation.

10. The combustion engine assembly according to claim 3, wherein said number of channels of said at least one honeycomb body is more than 750 cpsi, and said volume is 0.5 times said displacement.

11. The combustion engine assembly according to claim 3, wherein said channels are separated from one another by channel walls having an average thickness of less than 32 micrometers.

12. The combustion engine assembly according to claim 3, wherein said channels are separated from one another by channel walls having an average thickness of approximately 25 micrometers.

13. The combustion engine assembly according to claim 2, wherein said channels are separated from one another by channel walls having an average thickness of at most 40 micrometers.

14. The combustion engine assembly according to claim 2, wherein said channels are separated from one another by channel walls having an average thickness of at most 35 micrometers.

15. The combustion engine assembly according to claim 2, wherein said channels are separated from one another by channel walls having an average thickness of between 18 and 32 micrometers.

16. The combustion engine assembly according to claim 2, wherein said number of channels over said cross-section of said at least one honeycomb body is at least 600 cpsi, and said channels are separated from one another by channel walls having an average thickness of at most 32 micrometers.

17. The combustion engine assembly according to claim 2, wherein said catalytic converter is a three-way catalytic converter converting at least 98% of hydrocarbons and nitrous oxides in the exhaust gases during normal operation.

18. The combustion engine assembly according to claim 2, wherein said catalytic converter is a three-way catalytic converter converting 99% of hydrocarbons and nitrous oxides in the exhaust gases during normal operation.

19. The combustion engine assembly according to claim 2, wherein said number of channels of said at least one honeycomb body is more than 750 cpsi, and said volume is less than 0.5 times said displacement.

20. The combustion engine assembly according to claim 2, wherein said channels are separated from one another by channel walls having an average thickness of less than 32 micrometers.

21. The combustion engine assembly according to claim 2, wherein said channels are separated from one another by channel walls having an average thickness of approximately 25 micrometers.

22. The combustion engine assembly according to claim 1, wherein said at least one honeycomb body is a metallic honeycomb body having at least one of layered and wound sheet metal layers being at least partly structured.

23. The combustion engine assembly according to claim 22, wherein said channels are separated from one another by channel walls having an average thickness of at most 40 micrometers.

24. The combustion engine assembly according to claim 22, wherein said channels are separated from one another by channel walls having an average thickness of at most 35 micrometers.

25. The combustion engine assembly according to claim 22, wherein said channels are separated from one another by channel walls having an average thickness of between 18 and 32 micrometers.

26. The combustion engine assembly according to claim 22, wherein said number of channels over said cross-section of said at least one honeycomb body is at least 600 cpsi, and said channels are separated from one another by channel walls having an average thickness of at most 32 micrometers.

27. The combustion engine assembly according to claim 22, wherein said catalytic converter is a three-way catalytic converter converting at least 98% of hydrocarbons and nitrous oxides in the exhaust gases during normal operation.

28. The combustion engine assembly according to claim 22, wherein said catalytic converter is a three-way catalytic converter converting 99% of hydrocarbons and nitrous oxides in the exhaust gases during normal operation.

29. The combustion engine assembly according to claim 22, wherein said number of channels of said at least one honeycomb body is more than 750 cpsi, and said volume is less than 0.5 times said displacement.

30. The combustion engine assembly according to claim 22, wherein said channels are separated from one another by channel walls having an average thickness of less than 32 micrometers.

31. The combustion engine assembly according to claim 22, wherein said channels are separated from one another by channel walls having an average thickness of approximately 25 micrometers.

32. The combustion engine assembly according to claim 1, wherein said catalytic converter is a three-way catalytic converter converting at least 98% of hydrocarbons and nitrous oxides in the exhaust gases during normal operation.

33. The combustion engine assembly according to claim 1, wherein said catalytic converter is a three-way catalytic converter converting 99% of hydrocarbons and nitrous oxides in the exhaust gases during normal operation.

34. The combustion engine assembly according to claim 1, wherein said number of channels of said at least one honeycomb body is more than 750 cpsi, and said volume is less than 0.5 times said displacement.

35. The combustion engine assembly according to claim 1, wherein said channels are separated from one another by channel walls having an average thickness of less than 32 micrometers.

36. The combustion engine assembly according to claim 1, wherein said channels are separated from one another by channel walls having an average thickness of approximately 25 micrometers.

37. The combustion engine assembly according to claim 32, wherein said number of channels of said at least one honeycomb body is more than 750 cpsi, and said volume is less than 0.5 times said displacement.

38. The combustion engine assembly according to claim 37, wherein said channels are separated from one another by channel walls having an average thickness of less than 32 micrometers.

39. The combustion engine assembly according to claim 37, wherein said channels are separated from one another by channel walls having an average thickness of approximately 25 micrometers.

Evidence Appendix:

No evidence pursuant to && 1.130, 1.131, or 1.132 or any other evidence has been entered by the Examiner and relied upon by appellant in the appeal.

(if a 1.131 ore 32 Declaration was filed in this application, it must be appended to the Brief on Appeal).

Related Proceedings Appendix:

Since there are no prior or pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal, no copies of decision rendered by a court or the Board are available.